Consideration of Climate Change in State Implementation Plan Air Quality Modeling

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Public Health Workgroup
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Summary

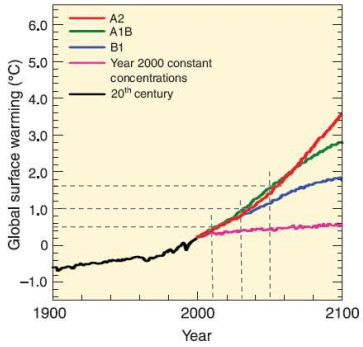
- IPCC forecasts of average surface temperature:
  - ~ + 1 °C by 2030
  - ~ + 1.6 °C by 2050
- Current ozone SIPs use extreme temperature conditions
- Temperature is only one of several factors affecting pollutant levels
- Climate change research projects
  - Do not directly account for national / international GHG controls by 2050

Global average surface temperature relative to 1980-1999 average:

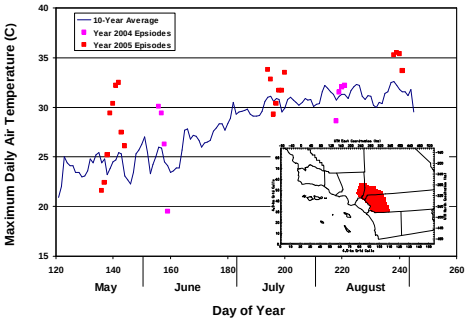
2010 ~ + 0.5 °C

2030 ~ + 1.0 °C

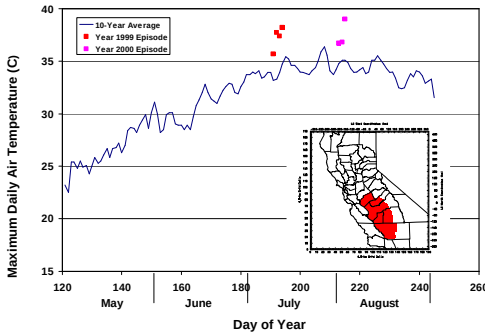
2050 ~ + 1.6 °C



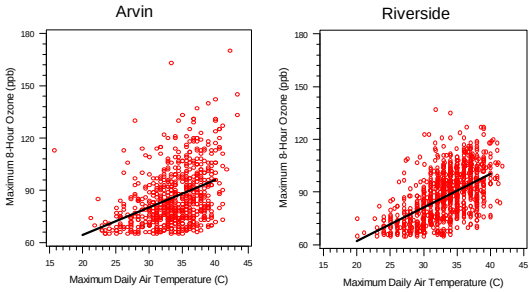
IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.



Maximum Daily Temperatures for the Inland Empire of the South Coast Air Basin for the episode days modeled



Maximum daily temperatures for the central and southern San Joaquin Valley for the episode days modeled



8-hour maximum daily ozone concentrations and maximum daily air temperature at Arvin and Riverside for the years 1996-2005.

Summary of SIP Modeling and Temperature

- **Current ozone SIPs already consider high temperature events**
- **Next round of ozone SIPs for the new 8-hour standard will include a climate change scenario for 2030**
- **Future SIP modeling will need to address climate change for 2050 with appropriate adjustments to all categories of the inventory**

ARB-Sponsored Climate Change Research Projects

Impact of Climate Change on Meteorology and Regional Air Quality in California
(Contract # 04-349, UC-Davis)

- Utilize Global Climate Model (GCM) outputs to drive fine scale modeling
- Natural and on-road emissions will be estimated using climate change (GCM) outputs
- Utilize South Coast specific inventory information from the South Coast Air Quality Management District
- Conduct fine-scale modeling to estimate ground level pollutant concentrations produced by the modified emissions fields

Expected completion date June 2010

Climate Variability and California Low-Level Inversions
(Contract # 06-319, UC San Diego)

- Use historical climate data to Investigate the frequency and causes of low level inversions in California, with a focus on the San Joaquin and South Coast air basins
- Analyze several climate change simulations to investigate changes in the frequency and intensity of conditions conducive to low level inversions during the next 100 years

Expected completion date June 2010

ARB-Sponsored Climate Change Research Projects *(cont.)*

Preliminary results from UCD study (Phase I):

- September 9, 1993 episode
- Strong temperature inversion
- Warm nights, hot days
- Peak ozone exceeded 250 ppb
- Temperature increase of 2 ℃
- Maintain constant RH

- ⇒ 30 ppb increase in ozone

- For more information:
  - *Dr. Nehzat Motallebi, Air Resources Board, 324-1744*

USEPA-Sponsored Climate Change Research Project

- Steiner et al.:
  - "Influence of future climate and emissions on regional air quality in California", JGR (2006)
- Conduct regional, fine-scale modeling for 2050:
  - Future emission scenario represents business as usual, and does not reflect effects of efforts currently being discussed to reduce greenhouse gas emissions to 80% below 1990 levels by 2050
  - Utilize global climate model results as inputs
  - Future emissions projected from current emissions using population growth and technology change
  - Population growth through 2050 from DOF, 2007
  - Assumes improved technologies and increased regulation will reduce VOC, CO, and NOx emission factors by 80% below present-day (circa 2000, already controlled) levels
  - Growth in the freight-transport sector is specified to be twice that of other sectors; thus diesel NOx emissions are predicted to increase in some areas (due to rapid growth), whereas VOC and CO emissions generally decrease